State of Connecticut

Enterprise Wide Technical Architecture:
Introduction
January 24, 2000
Version 1.1

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The Department Information Technology (DOIT) was created in 1997 to consolidate and centralize responsibility for information technology into one agency, under a Chief Information Officer reporting directly to the Governor. The goals of this new department have been to centralize and consolidate the State's Information Technology (IT) infrastructure; standardize IT platforms, services and solutions; facilitate information sharing; and to align IT with the business needs of the State of Connecticut. To support these goals, the first iteration of the a new enterprise architecture process was completed in six months by teams of technical and business personnel representing DOIT, agencies, Judicial, and the constitutional officers. This process was used to create a statewide technical architecture for the State of Connecticut. The technical architecture will continue to evolve over time, with the latest versions of the architecture documents available on the DOIT web site at http://www.doit.state.ct.us/policy/policy.htm.

Executive Summary

The State of Connecticut's current IT environment is heterogeneous and fragmented. It is a conglomeration of self-contained systems designed to meet the specific needs of individual agencies operating independent, self-sufficient programs. The State of Connecticut does business very differently now, and there is a pressing need for coordinated service delivery across agencies, citizen-centric one stop shopping, partnerships with external organizations, and streamlined administrative business processes. DOIT's challenge is to implement an IT environment that supports this new business model by building the IT infrastructure needed to connect agencies to each other and their customers, and to provide appropriate access to information from any place, at any time.

To meet this challenge, DOIT embarked on a project in April 2000 to create a statewide technical architecture that will provide the framework for making strategic technology investment decisions on a cost effective, enterprise basis. These IT decisions must also meet the diverse business needs of the agencies in the executive branch, the constitutional officers, higher education institutions, and the other branches of state government.

It was determined from the beginning of the project that to be successful, the State of Connecticut's technical architecture would have to:

- Be based on the strategic business direction of the state as an enterprise,
- Be based on a planning process that supports strategic business planning as well as ongoing tactical decisions made when implementing systems,
- Involve agency business managers as well as IT staff throughout the process,
- Provide strategic direction for making technology decisions without requiring wholesale and major changes to the current IT environment,
- Allow agencies to share many IT infrastructure components without sacrificing responsiveness to the changing business needs of individual agencies,
- Reduce the time it takes IT to satisfy ever shorter agency business change cycles by making the IT environment adaptable to change,
- Reduce the cost of IT over the lifecycle of each system,
- Have a governance process that supports the ongoing evolution of the architecture as well as its enforcement,

- Evolve in synch with changing business strategies,
- Be implemented in a short amount of time to avoid analysis paralysis.

META Group Inc. of Stamford, Connecticut was chosen to provide an industry-proven architecture process model that meets these criteria along with the consulting expertise to implement it. The State of Connecticut has chosen to retain the name Enterprise-Wide Technical Architecture (EWTA) from the process model to describe the State's statewide technical architecture deliverables.

A team of IT planning specialists in DOIT comprising the IT Architecture Division was dedicated to implement the enterprise architecture process model with the help of the META Group. They have been charged with making the planning process a self-sustaining program with a governance process to evolve the architecture as well as maintain it. In May 2000, an Architecture Team, made up of six DOIT and six senior agency managers, was established to articulate the enterprise business requirements of the State for the EWTA. These business requirements were documented in two key documents: the Common Requirements Vision and the Conceptual Architecture Principles (see next section for an overview of the process). The Common Requirements Vision represents the environmental trends, major business drivers, business information requirements and requirements for technical architecture that tie the IT architecture to the business. The Conceptual Architecture Principles represent the core business and technical principles on which all the technical domain architectures are based.

META Group worked with the Architecture Team to define nine domains, or groups of related technology, that include virtually all of the components utilized in Information Technology. Nine teams of technical experts from throughout the State of Connecticut were deployed to develop the technical architecture for each domain. The results are documented in nine Technical Domain Architecture Documents.

In addition to the architecture teams, two important boards were convened to oversee and govern the enterprise architecture process. The Business and IT Strategy Board is made up of senior agency management and is chaired by Rock Regan, the State's Chief Information Officer. This group is the executive steering committee for enterprise architecture and assures that IT is firmly based on the business needs of the State. The Architecture Review Board is made up of DOIT senior management and agency program directors and is chaired by Mark Bannon, the State's Chief Technology Officer. This board approves and enforces the architectures specified in each Technical Domain Architecture Document.

The EWTA Technical Domain Architecture Documents define design principles, technical standards, product standards, and implementation guidelines that will be utilized by the agencies, DOIT personnel, and vendors and consultants implementing state systems. These documents plus the Conceptual Architecture Principles constitute the State's Enterprise-Wide Technical Architecture to which new systems and major enhancements must conform.

Overview of the Enterprise Architecture Process

The enterprise architecture process model, as adopted by the State of Connecticut, defines an iterative process that continues to evolve on a planned basis. The business requirements will be refreshed annually to reflect changes in the overall business directions and needs of the State.

Some of the domain architecture components on the other hand will be refreshed almost continually. The rate of change within some technology sectors requires close monitoring in order to anticipate and respond to shifting technology trends, changes in the marketplace, and strategic developments within the international standards organizations.

Phase One

The first phase of the enterprise architecture process cycle defines the business requirements of the State as an enterprise, and documents them as The Common Requirements Vision.
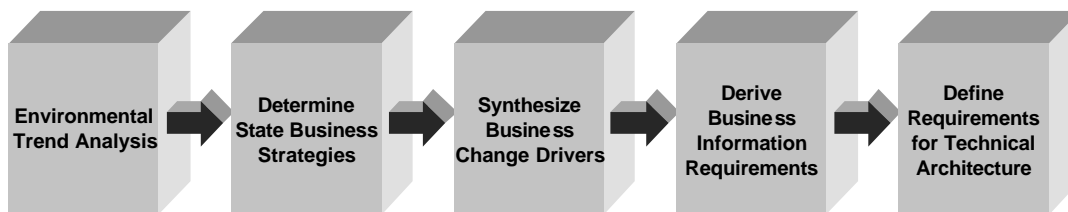

Figure 1 Process steps for phase one of the enterprise architecture process

Lacking a comprehensive business plan for the State, the Architecture Team chose to interview the commissioners of 14 key agencies, the Chief Court Administrator, and the Director of Legislative Management. The remainder of the agencies, constitutional officers, and the higher education institutions were asked to complete a survey version of the interview questions. The interviews and surveys were designed to find the key external Environmental Trends such as legislative mandates, federal requirements, changes in the way services are expected to be delivered by constituents, as well as the major Business Strategies being planned by these organizations. These Environmental Trends and Business Strategies were then consolidated into eleven key Business Change Drivers for the State of Connecticut. Each Business Change Driver is a "theme" that represents a related set of environmental trends and business strategies. These became the business and IT objectives that must be addressed by the IT architecture.

The Architecture Team then identified the information required by the business decision-makers and the activities needed to satisfy the enterprise Business Change Drivers. The information described:

- What information is needed?
- Who needs it?
- When (how often) is it needed?
- Where does it come from?

The results were documented as the 30 Business Information Requirements for the EWTA.

The final step of phase one translated the Business Information Requirements into 14 Requirements for Technical Architecture. The resulting Requirements for Technical Architecture can be traced back through the Business Information Requirements, the Business Change Drivers, the Business Strategies, and the Environmental Trends that were identified in the interviews and surveys.

Phase Two

The second phase of the enterprise architecture process defined the Conceptual Architecture Principles that are based on the business requirements of The Common Requirements Vision. These principles guide the implementation of technology to meet these requirements. They are the rules that guide investment and design decision-making to maximize business benefit and the adaptability of the IT environment. Guided by industry best practices provided by META Group research, the Architecture Team articulated the principles in basic business language that can be understood by all those involved in the IT decision making process. The team developed 23 Conceptual Architecture Principles organized into three categories: business oriented, technology oriented, and business continuity oriented. A complete description can be found in the Conceptual Architecture Principles document.

The final deliverable for phase two was the definition of the technical architecture domains and their technology components. The Architecture Team identified nine technology domains, i.e. closely related groups of technology. These domains were used to organize teams of technical experts to work together to develop each domain technical architecture.
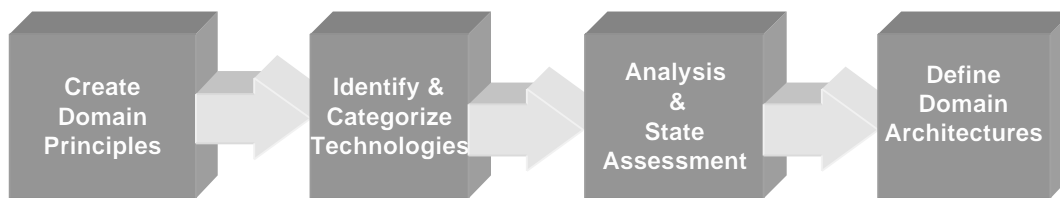
Phase Three

Figure 2 The four steps of the domain architecture process

Phase three of the enterprise architecture process began by identifying and training the nine Technical Domain Teams and their team leaders. The teams were asked to verify that the technology components assigned to their domain by the Architecture Team were appropriate for the domain and that team had enough expertise to cover them. Each domain team then defined the technical components that make up their domain and described relationships of components to each other when possible. Some components, such as directory services, cross multiple domains. These multi-domain components were assigned to a single domain and that team was given the responsibility of coordinating any planning issues with other domains. In the case of security, because of its extreme importance and its impact on all domains, a separate domain was dedicated to this function.

Some components were reassigned and additional expertise was added to the teams. Mission statements were developed to articulate the strategic goals of each domain. The teams then reviewed the Conceptual Architecture Principles, endorsing those that were appropriate for the domain and then making each principle more meaningful for that domain without changing it's original intent. The principles were further refined by adding additional implications identified by the Requirements for Technical Architecture in the Common Requirements Vision.

The current IT environment in the State was then assessed to categorize each IT product and standard currently in use. These categories were Strategic, Transitional, Obsolete or Research depending on how each best meets the strategic direction defined in the principles (see **Standards** in next section). Experts from META Group, Gartner Group and from throughout

the State were consulted as part of the analysis. Each team also researched the technology components to provide guidelines, best practices and if possible recommended configurations for implementation. Existing IT policies that are pertinent to the domain were included or referenced. Finally, teams identified the gaps between the current environment and the strategic needs of the State for follow-up initiatives, transition planning and ongoing architecture development.

Using the Enterprise-Wide Technical Architecture Documents

The nine technical architecture domains are:

1. Platforms
2. Networks
3. Security
4. Enterprise Systems Management
5. Middleware
6. Data Management and Data Warehouses
7. Application Development
8. Collaboration and Directory Services
9. Web E-Government

Each of the nine domain teams of technical experts from DOIT and the agencies developed a document that could stand on its own as a guideline for agency and DOIT staff as well as consultants and vendors. This resulted in some redundancy in describing design and implementation principles, but should aid IT implementers and decision makers that are interested in the standards, policies, guidelines and best practices in their area of interest, but do not want to read the entire set of domain technical architecture documents. This also facilitates using the architecture documents for technology specific planning and procurement activities.

Guidelines and best practices for implementation are practical recommendations for implementing IT**. On the other hand, **the principles, standards and policies referred to in these documents are considered mandatory State IT architecture requirements for any new system or major enhancement to the current IT environment.** The EWTA Exception Process for requesting exceptions to these requirements is outlined in the Maintaining the EWTA section of this Introduction.

Domain Document Contents

Mission Statement – Identifies the strategic goals of the domain. This statement is also used to describe the target environment that the team felt was appropriate for the State as an enterprise.

Component Descriptions – Each component is described to assure consistent definitions within and across the domains. These descriptions also help readers get up to speed in technology areas they may not be familiar with and allows the team to share information provided by the research conduced on each component.

Domain Principles – Based on the EWTA Conceptual Architecture Principles, the domain principles define the rules for making IT decisions in this domain. For most domains, these are the design guidelines for implementing systems using these technology components. The domain principles also include justifications, or rationale for the principle, as well as the implications of that principle. These principles also become the enterprise requirements for making decisions about technology and product standards.

Standards – Each team evaluated current products as well as technical standards based on its ability to meet the Principles and the Requirements for Technical Architecture. Given that one of the key principles of the EWTA is to reduce complexity, most teams tried to keep the number of strategic recommendations to the minimum number possible. To understand the technical and product standards, the narratives should be used in conjunction with any summary tables provided.

The technical and product standards were evaluated based on the following.

Strategic - These are the standards and products selected by the state for development or acquisition, and for replacement of obsolete or transitional standards or products. (Strategic means a three to four year planning horizon.) When more than one similar strategic standard or product is specified for a technology category, there may be a preference for use in statewide or multi-agency development. These preferred standards and products are indicated where appropriate.
Note: some strategic products may be in "pilot testing" evaluation to determine implementation issues and guidelines. Pilot testing must be successfully completed prior to full deployment by the agencies or the State.

Transitional - These are standards or products in which an agency or the State has a substantial investment or deployment. These standards and products are currently supported by DOIT, the agencies, or the vendor (industry, manufacturer, etc.). However, agencies should undertake development using these standards or products only if there are no suitable alternatives that are categorized as strategic. Plans should be developed by the agencies or the State to move from transitional to strategic standards or products as soon as practical. In addition, the State should not use these standards or products for development.
Note: many older versions of strategic standards or products fall into this category, even if not specifically listed in a domain architecture document.

Obsolete - It is highly likely that these standards or products, while still in use, will not be supported by the vendor (industry, manufacturer, etc.) in the future. Some products and standards have already reached the non-supported state. Plans should be developed by the agencies or the State to rapidly phase out and replace them with strategic standards or products. No development should be undertaken using these standards or products by either the agencies or the State.

Research / Emerging - This category represents proposed strategic standards and products that are in advanced stages of development and that should be evaluated by the State. Some of these standards or products may already be undergoing "hands-on" evaluation. Others will need to be tracked and evaluated over the next 6 to 18 months.

Best Practices – Another guideline for implementing IT to meet the goals of the EWTA is best practices. These recommendations are practical advice based on the experience and research of each team for implementing IT solutions that are compliant with the EWTA.

Configurations – To meet the principles of reducing complexity and total cost of ownership, some infrastructure components were defined down to the configuration level. These are typically components that DOIT is currently responsible for providing on a statewide basis.

Gaps – Each team identified areas or components within their domain that require further research and analysis because the current products or standards are not sufficient to meet the strategic goals of EWTA. The gaps identified will be prioritized and will provide the road map for follow-up activities by each team.

Maintaining the EWTA

An Enterprise Wide Technical Architecture is never completed. The first iteration of the enterprise architecture process in the State of Connecticut recognizes that there are gaps in the current technical environment that need to be filled to meet the strategic needs of the State. For the EWTA to be a meaningful tool for decision making, the domain teams will continue to address those gaps. While that work progresses, continual changes in the business and IT environments require all components of the EWTA to be constantly evaluated individually and in terms of their relationship with each other.

Another component of maintaining EWTA is the enforcement of the architecture standards. The Department of Information Technology reviews compliance to EWTA via its responsibility for agency IT planning and IT procurement oversight. The key to administering this compliance role is good communications and planning. Of course even the implementation of IT architecture requires exceptions at times. The process for requesting an exception to the EWTA principles and standards is outlined in the EWTA Exception Process section at the end of this Introduction.

To meet this need for maintaining the EWTA, an organizational structure has been put in place. The following is a description of the different groups involved in the enterprise architecture process and their roles.

Business and IT Strategy Board

The Business and IT Strategy Board exists to ensure the alignment of IT with the business requirements of the State and its agencies. This group verifies the Common Requirements Vision and approves the Conceptual Architecture Principles of the EWTA. The board works with the Architecture Team to keep the Requirements for Technical Architecture and the Conceptual Architecture Principles current with the business needs of the State. They provide important advice and support for new statewide IT initiatives and policies, as well as adjudicate final appeals for exceptions to architecture standards.

Architecture Review Board

The Architecture Review Board (ARB) is responsible for the promotion, approval and enforcement of the technical standards. Its membership is made up of senior IT and agency personnel. The ARB approves domain team deliverables (i.e. technical standards, design principles, product standards, best practices, and standardized configurations) and adjudicates appeals for exceptions to architecture standards.

Technical Domain Teams

The technical domain teams provide the knowledge and expertise required to develop the technical architectures and standards for the enterprise architecture process. Each team is made of technical experts from throughout the State. These teams are responsible for the development and maintenance of the Domain Architecture Documents, including the domain specific deliverables (i.e. design principles, technical standards, product standards, standard configurations, and best practices). The teams are expected to keep abreast of new technology and make recommendations on new technology to close gaps in the current environment.

Enterprise Architecture Team

The architecture team translates the agencies' requirements into a business driven IT direction. Its members include senior IT and agency personnel. This important team develops and updates the Common Requirement Vision and Conceptual Architecture Principles that document the business needs of the State for the technical architecture.

DOIT Architecture Division

The Architecture Division coordinates the enterprise architecture process and its associated activities. The division is responsible for coordinating all technical domain team activities as well as communications and web site content.

The EWTA Exception Process

An exception to the standards defined in the EWTA can be requested for several reasons.

1. An initial architecture review was performed as part of project approval by DOIT and non-compliance to the EWTA was identified. The agency can file a request for an exception to the architecture for this project. The exceptions will only be addressed at regularly scheduled Architecture Review Board (ARB) meetings.

2. Once a project has been approved and the project is in an implementation phase, an agency may find a need to deviate from the standards in the EWTA for business reasons. This type of exception request would also cover procurement situations where an agency is in the process of evaluating proposals to an RFP, SOW, etc. An agency can also request an expedited review if the situation warrants it and the ARB will convene a meeting to review the request. Otherwise review will be scheduled for the next ARB meeting.

A written request to the ARB should document the justifications for the exceptions and the impact of granting versus not granting this request.

If an exception is not granted to the agency, an appeal can be filed to the Business and IT Strategy Board. This appeal should be in writing and should state clearly the business reasons for granting the exception.

Please note: Requests for exceptions and appeals must use the appropriate template for submission.